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ABSTRACT

This paper compared the effects of three hypothesized determinants of population change due to migration in 207 nonmetropolitan counties in northeastern United States: (1) the population's socioeconomic status; (2) functional differentiation of community activities; and (3) linkages relating the local, regional, and national economics. Data were obtained from a data file compiled primarily at Cornell University as part of a Northeast Regional Research Project. Multiple indicators of each concept were classified using factor analytic techniques. Having obtained satisfactory factors for 1960, a similar analysis was performed for the same variables measured in 1950 to assess the stability of the factor structure. Of the hypothesized determinants, the level of and change in socioeconomic status appeared to be of greatest importance. The level of differentiation had no effect on net migration among nonmetropolitan counties in the Northeast; however, change in differentiation had the expected positive effect in both urban and rural counties. Subsequent regression analytic procedures indicated that county socioeconomic status was of substantial importance and economic linkages of virtually no importance in statistically explaining intercounty differentials in rates of net migration. (NQ)

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POPULATION CHANGE DUE TO MIGRATION IN NON-METROPOLITAN COUNTIES OF THE NORTHEAST

by

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Introduction

A large number of studies have attempted to identify correlates or causes of net migration for various areas (States, counties, SMSAs, etc.) of the United States and of Europe. Among correlates or causes often investigated are income or wage levels (Sjaasted, 1960; Bunting, 1961; Tarver, 1961; Kariel, 1963; Raimon, 1962; Balakrishnan, 1963; Lovgren, 1956), unemployment (Tarver, 1961; Oliver, 1964; Blanco, 1963, 1964; Balakrishnan, 1963; Watson, 1959; Anderson, 1953; Bogue et al, 1957), various measures of population size (Kariel, 1963; Karp and Kelly, 1971; Anderson, 1953), and climate (Kariel, 1963; Balakrishnan, 1963). The units of analysis most often employed in these and other studies of net migration are metropolitan areas. As a departure from this tendency, this paper reports the results of an investigation of net migration for non-metropolitan counties of the northeastern United States[1]. The objectives of the study are to identify characteristics of non-metropolitan counties of importance to their patterns of net migration and to understand, however tentatively, the reasons for obtaining the results we did.

We chose to focus on several characteristics of non-metropolitan counties which we thought had an effect on net migration. First, the socioeconomic status of the population should provide

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1. The Northeast, as defined here, includes the New England and Middle Atlantic States, plus West Virginia, Delaware, and Maryland.

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an indication of the general desirability of the area as a place of residence. The higher the SES of a county and the greater the improvement in SES, the higher too should be its rate of net migration. Second, the differentiation of functions within a county should provide an indication of the diversity of employment opportunities and of the variety of services available within the area. The greater either of these, or the greater the increase in these, the higher should be the rate of net migration. Finally, the growth potential of the local economy is probably related to the extent of its links to the larger regional and national economy. The more extensive these linkages and, hence, the greater the potential for economic growth, the greater should be the area's rate of net migration; further, the greater the increase in these linkages, the higher should net migration rates be. The remainder of the paper examines these three propositions.

Data and Methods

The data employed have been obtained from a data file compiled primarily at Cornell University as part of the Northeast Regional Research Project (NE-47) "Consequences of Changing Social Organization in the Northeastern United States, 1950-1970". The particular variable used, collected for the 207 non-metropolitan counties in the Northeast in 1960, are as follows:

A. Independent variables

1. Economic linkages

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a. Total number of manufacturing establishments, 1963

b. Number of manufacturing establishments employing 100 or more, 1963

c. Value added by manufacture, 1963

d. Number of top 200 (Fortune Magazine) corporations present, 1960

2. Socioeconomic status

a. Median family income, 1959

b. Rate of male unemployment, 1960

c. Median educational attainment for population 25 years old and over, 1960

d. A measure of income equality, 1960: 100% - (% with incomes over $10,000 + % with incomes under $3,000)

3. Functional differentiation - all are Guttman Scales

a. Medical specialties, 1960: 19 items

b. Transportation, 1960: 7 items

c. Communication, 1960: 6 items

d. National organizations, 1960: 10 items

e. Community services, 1960: 16 items

f. Planning organizations, 1960: 8 items

B. Dependent variables

1. Rate of net migration, 1960-70

2. Rate of population change, 1960-70

While there are some a priori reasons for grouping these variables together as we have, this is unnecessarily arbitrary.

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The 14 independent variables have been factor analyzed to verify the grouping procedure. The results of an orthogonal (Varimax) solution is presented in Table 1. The factor loadings indicate that the preliminary impressionistic groupings were basically sound. Only one variable - the transportation differentiation scale - failed to attain a loading of .4 although it very nearly did. Its communality was also the lowest, but because of the consistency of its loading we decided to retain the transportation scale as an independent variable.

[TABLE 1 HERE]

The three factors account for about 73 percent of the total variance in the 14 items. Of this, the economic linkage factor accounts for 68 percent, the differentiation factor accounts for 19 percent, and the SES factor accounts for the remaining 13 percent.

Having obtained satisfactory factors for 1960, we then proceeded to perform a similar analysis for the same variables measured in 1950 to assess the stability of the factor structure. Table 2 presents the same information as Table 1, except for the differing time period. The same three factors appear for 1950 as for 1960. The 1950 structure, however, is additionally complicated by two facts: first, unemployment joins the transportation differentiation scale in having no loadings over .4 and having low communalities; and second, the planning organization differentiation scale has fused loadings with differentiation (as expected) and economic linkages. This fusion may be

understandable in terms of the organizations included as planning scale items, several of which have as an objective the establishment of new economic linkages (e.g., urban renewal projects, industrial development corporations, etc.).

[TABLE 2 HERE]

The three factors in 1950 accounted for about 68 percent of the total variance in the 14 items. The economic linkage factor accounts for 76 percent, differentiation for 15 percent, and SES for the remaining 9 percent of the variance explained by the three factors.

A glance at the two factor matrices indicates a considerable amount of structure stability from 1950 to 1960, both within and between factors. Product movement correlation coefficients between corresponding factor loadings (in 1950 and 1960) for the economic linkage, SES and differentiation factors are, respectively, .99, .84 and .88. The overall correlation is .90, supporting the impression that considerable structural stability holds between 1950 and 1960.

Having reduced our 14 variables to three orthogonal factors, we then obtained three factor scores for each county for both 1950 and 1960. The 1960 scores will be used directly as independent variables in regression analysis. In addition, we obtained difference scores (i.e., 1960 factor score - 1950 factor score) which will also be used as independent variables in the regression analysis.

The two classes of independent variables will then be entered separately in regression analyses with rate of net

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migration between 1960 and 1970 as the immediate dependent variable, but with rate of population change, 1960-70, as itself, dependent upon net migration rate.

Findings

Between 1960 and 1970, 81 non-metropolitan counties in the Northeast had net migration gains; the largest gain was experienced by Putnam County (New York) on the northern fringe of the New York SMSA with a net migration rate of 65.6 percent. Sussex County (New Jersey) also had a high net migration rate - 44.1 percent. One county had no net migration and the remaining 125 counties experienced population loss through net migration during the 1960's; Webster and McDowell Counties (West Virginia) had the largest losses - 38.7 and 38.4 percent, respectively. Three states - New York, Pennsylvania and West Virginia - contained 97 of the 125 counties which had net migration losses. Overall, the 207 counties had an average net migration rate of -1.5 percent indicating that as a group these non-metropolitan counties sustained fairly small population losses through migration. Substantial variability exists in net migration rates as reflected in a standard deviation of 14.5. These counties actually gained population since their average rate of natural increase was 8.4 percent resulting in a population growth rate of 6.9 percent.

We turn now to an attempt to account for some of the above described variability in rates of net migration. Table 3 presents standardized partial regression coefficients (beta

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weights) and zero-order correlation coefficients obtained for the two sets of independent variables. We have indicated those beta coefficients which are statistically significant at the .05 level. Since we have not sampled a universe we cannot draw the usual statistical inferences about a relationship probably holding in a universe; rather, significance in this case can be taken to mean that we can reject a "random model" explanation of those relationships which are significant (cf., Stinchcombe, 1966:23).

[TABLE 3 HERE]

The beta coefficients for the 1960 factors (the top panel of Table 3) reveal that only the SES factor has any substantial impact upon 1960-70 net migration rates. The small effect of economic linkages is in the anticipated direction while the small effect of differentiation is not. The 1960 levels of differentiation and economic linkages have no appreciable impact on net migration, while counties with a high 1960 level of socioeconomic status (i.e., with high incomes, education and income equality, and low unemployment) experienced high population gains through net migration during the succeeding decade.

When we measure the effect of changes in the three factors on net migration rates a somewhat different picture emerges. Now, changes in both economic linkages and differentiation have a direct effect on net migration; an increase in linkages or an increase in differentiation result in relatively

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high rates of net migration. These effects are overshadowed by SES, however; an increase in SES during the 1950's results in a high rate of net migration during the 1960's.

If we conceive of net migration, itself a change variable, as a response or adaptation to changing community conditions, then it is not surprising that the change variables each have an effect on net migration while only one of the static variables is important. Nonetheless, our original reasoning concerning anticipated effects of economic linkage and differentiation levels on net migration may still have merit. The non-metropolitan counties we are investigating are quite heterogeneous in terms of their size as well as their standing with respect to all of our variables. The size effect, in particular, may be important since size has been shown to have a consistent positive effect on migration rates and probably also has an effect on economic linkages and differentiation. With this in mind we have dichotomized our counties according to the population size of their major community. In 1960, 82 of the non-metropolitan counties had cities of 10,000 population or more, while 125 did not; we will refer to these as "urban" and "rural", respectively. If economic linkage and differentiation levels are to have an effect on net migration, this effect is more likely to be observed for urban than rural counties.

[TABLE 4 HERE]

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Table 4 presents beta coefficients for the regression of net migration rates on the two sets of independent variables separately for non-metropolitan urban and rural counties. The level of differentiation in 1960 continues to be of little or no importance in either class of counties, just as SES continues to be of substantial importance in both. The level of economic linkages, on the other hand, now emerges as an important predictor of net migration in urban but not rural counties. This suggests that among units possessing numerous and, more importantly, diverse linkages, this factor has an impact on net migration; the urban counties, as one might expect, have higher linkage scores (a mean of .33 as compared with -.22 for rural counties) and there is also greater variability in linkage scores among urban counties (a standard deviation of 1.51 as compared with .25 for rural counties). The lower panel of Table 4 indicates that a change in economic linkages is a relatively unimportant predictor of net migration rates in rural counties and important in urban counties.

Finally, we can note that rate of net migration is by far the major determinant of population change. When we regress rate of population change on its two components - rate of net migration and rate of natural increase - we obtain beta coefficients of .910 and .268 respectively. This means, most simply, that to the extent that one is successful in explaining intercounty variation in net migration rates one has also gone a long way in explaining intercounty variation in (not necessarily levels of) population change rates. Paranthetically, this is

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an interesting statistical situation; one variable - population change - is completely determined by its two components. In such cases the beta coefficients resolve themselves into the ratio of the standard deviation of the independent to the standard deviation of the dependent variable. Because rates of natural increase are relatively invariant, this component is not strongly related to population change.

Discussion

Of those hypothesized determinants of net migration which we have considered, the level of and change in SES appears to be of greatest importance. While our initial speculation about the desirability of living in counties with high SES has received support and may be valid, an alternative interpretation may be advanced. To some extent a change in SES will have come about as a direct consequence of past net migration and the level of SES will have been similarily effected by past migration. That is, differential migration is one way, and perhaps an important way, in which the SES of an area is improved. If this is true, and we are unable to assess this possibility, then change in SES and level of SES may be acting as a proxy for past net migration. Since 1950-60 and 1960-70 net migration rates for these counties are highly correlated ($r = .815$), the effect of SES and SES change on the 1960-70 net migration rate may partially reflect the strong persistence of rates of net migration over the fairly short run.

All this is not to argue against SES itself having an

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effect on net migration. Of our factors this is the only one containing items (e.g., income and unemployment) which have been shown in numerous studies to have effects on net migration. Undoubtedly, the socioeconomic characteristics of an area and the magnitude of change in such characteristics are important considerations both to potential in-migrants and to the residents of an area. The data show, in fact, that these considerations are somewhat more important in rural than in urban counties.

The notion of economic linkages is related to the idea of an economic base although the former, as defined here, is more narrowly conceived than the latter; the linkages we have considered are mainly manufacturing, while a community's economic base may include non-manufacturing activities as well (e.g., educational institutions, recreational facilities, wholesale and retail trade, etc.). Nevertheless, manufacturing activities are always economic base (that is to say, export) activities in modern industrial societies, so we have an indication from the change in economic linkage factor of the degree to which the economic base is expanding. An expanding economic base implies the creation of new jobs, many of which will be filled by new arrivals. (For a systematic treatment of urban economic base approach to the study of migration, see Karp and Kelly, 1971).

The level of economic linkage also has a positive effect on net migration among urban counties; this is partially a reflection of the 1950-60 change in linkages on the 1960 level (the correlation between the two is .25). It probably also

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reflects the potential for expansion of jobs without further increases in linkages; that is, once linkages have been established, these can expand, increasing job opportunities, without a further increase in the number of linkages.

We should stress that the economic linkage factors exert appreciable effects on migration only in urban non-metropolitan counties. This is not surprising since rural counties generally have only very limited economic linkages as we have defined them.

In no case does the level of differentiation have an effect on net migration among non-metropolitan counties in the Northeast. Change in differentiation, however, does have the expected positive effect in both urban and rural counties. Just as we regarded economic linkages as an indication of the export base, we can regard the differentiation factor as an indicator of the scope and diversity of local or community maintenance activities. The greater the change in internal differentiation, the greater will be the change in the variety of local (as opposed to export) employment opportunities and the greater, too, will be the change in variety of services available to the local populace. Both of these can, and probably do, constitute attractions to potential in-migrants and to the residents of the area. Apparently, adjustment through migration to changes in this factor occur sufficiently rapidly so that the actual level of differentiation has no effect on migration.

[FIGURE 1 HERE]

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By way of a summary, Figure 1 presents the change factors (the level factors can be easily substituted) in a path model including the three demographic variables for all 207 non-metropolitan counties. This figure makes quite clear the impact of the independent variables on population change as well as on net migration; their effects are only slightly attenuated - by a factor of .909 - by the intervening variable rate of net migration. The residual variable of net migration is substantially higher than any of the measured factors, indicating that much of the variation in net migration rates has to be accounted for.

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TABLE 1: Varimax Rotated Factor Matrix, with Communalities and Eigen Values, for 207 Non-Metropolitan Northeastern Counties, 1960

Variable	Factors: Economic Linkages	Socio-Economic Status	Differentiation	Communalities
No. of Mfg. Ests.	.763	.239	.377	.869
No. of Larger Mfg. Ests.	.895	.165	.329	.933
Value Added Mfg.	.963	.151	.224	.940
No. of Top 200 Corps.	.801	.124	.209	.832
Mdn Income	.285	.818	.316	.837
Unempl. Rate	-.105	-.687	-.014	.444
Mdn Education	.076	.785	.171	.628
Income Equality	.142	.825	.301	.825
Med. Spec.	.240	.209	.747	.603
Transport	.177	.123	.376	.264
Communication	.224	.096	.786	.613
Nat'l Orgn.	.272	.364	.548	.530
Comm. Sup.	.092	.114	.738	.513
Planning Orgn.	.380	.160	.645	.615
Eigen Value	6.68	1.53	2.03	

* Loadings greater than .4 are underlined.

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TABLE 2: Varimax Rotated Factor Matrix, with Communalities and Eigen Values, for 207 Non-Metropolitan Northeastern Counties, 1950

	Factors			
Variable	Economic Linkages	Socio-Economic Status	Differ-entiation	Communalities
No. of Mfg. Ests.	.692	.247	.399	.809
No. of Larger Mfg. Ests.	.868	.163	.366	.905
Value Added Mfg.	.945	.124	.251	.888
No. of Top 200 Corps.	.776	.089	.190	.696
Mdn. Income	.349	.774	.332	.867
Unempl. Rate	.013	-.227	-.093	.284
Mdn. Education	.062	.539	.094	.365
Income Equality	.173	.849	.296	.845
Med. Spec.	.274	.238	.619	.547
Transport	.177	.256	.380	.280
Communication	.268	.200	.759	.617
Nat'l Orgn.	.354	.305	.643	.633
Comm. Sup.	.168	.214	.702	.525
Planning Orgn.	.416	.279	.553	.562
Eigen Value	6.73	1.14	1.63	

* Loadings greater than .4 are underlined.

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TABLE 3: Correlation and Beta Coefficients of Net Migration Rates, 1950-60, on the Economic Linkage, Differentiation and SES Factors: 207 Northeastern Counties

Independent Variable	r and beta with 1960-70 NMR	
	r	beta
1960		
Economic Linkage	.108	.103
Differentiation	-.033	-.081
Socioeconomic Status	.603	.608*
R^2		.380
Change 1950-60		
Economic Linkage	-.068	.231*
Differentiation	.037	.279*
Socioeconomic Status	.439	.579*
R^2		.249

* Beta Coefficients are twice their standard error.

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TABLE 4: Beta Coefficients of Net Migration Rates, 1960-70, on the Economic Linkage, Differentiation, and SES Factors: Urban and Rural Counties of the Northeast

Independent Variables	Urban beta Coefficients	Rural beta Coefficients
1960		
Economic Linkage	.233*	-.050
Differentiation	.037	-.123
Socioeconomic Status	.509*	.635*
R^2	.267	.439
Change 1950-60		
Economic Linkage	.366*	.194
Differentiation	.257*	.352*
Socioeconomic Status	.494*	.679*
R^2	.248	.306

* Beta Coefficients are twice their standard error.

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FIGURE 1: A Model of Factors Affecting Rates of Net Migration and Population Change: 207 Non-Metropolitan Northeastern Counties

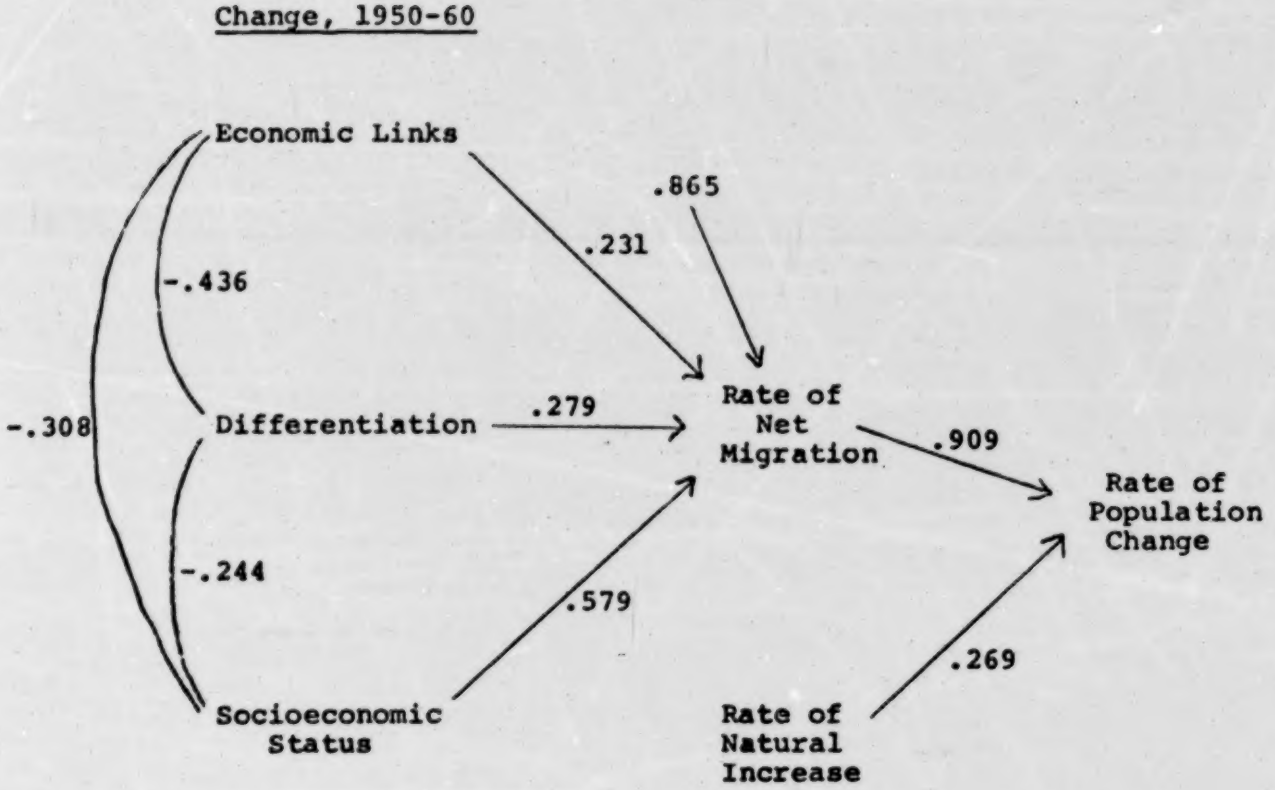

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TABLE 5: Beta Coefficients of Net Migration Rates, 1960-70, and Net Migration Rate Residuals[1], on First Order Interactions of Economic Linkage, Differentiation, and SES Factors: Non-Metropolitan Northeastern Counties

Independent Variables	Dependent Variables	
First Order Interaction of 1950-60 Change Factors:	1960-70 Net Migration Rates	1960-70 Net Migration Rate Residuals[1]
Economic Linkage X Differentiation	.147*	.170*
Economic Linkage X SES	.378*	.152*
Differentiation X SES	.266*	.163*
R^2	.161	.053

1. Residuals of NMR were defined as follows: Predicted values of NMRs under the additive model (NMR_p = - 1.475 + 10.93EL + 9.32D + 13.31 SES) were obtained; the difference between these predicted values and the actual NMRs are NMR residuals (i.e., the variation in NMR left after the additive model has explained all it can).

* Beta Coefficients are twice their standard errors.